Hard Ride

Traffic-Related Pollution May Alter Heart Function in Urban Cyclists

People who ride bicycles along roadways may incur considerable exposure to traffic-related air pollutants that have been associated with adverse respiratory and cardiovascular effects in epidemiologic studies. A new study examined changes in heart rate variability (HRV) and respiratory factors in cyclists exposed to traffic-related air pollutants and found that ultrafine particles as well as ozone and nitrogen dioxide (NO_2) altered autonomic regulation of the heart [***EHP* 119(10):1373–1378; Weichenthal et al.**].

Forty-two healthy individuals (28 men and 14 women aged 19–58 years) participated in the study, which involved cycling for 1 hour indoors or along high-traffic or low-traffic routes in Ottawa, Ontario. Thirty-eight participants completed all three routes. Continuously recorded electrocardiograms provided cardiac data, and respiratory function was measured by spirometry. Cyclists were equipped with pannier-mounted instruments to collect real-time information on fine particles, ultrafine particles, and black carbon, while technicians on bicycles equipped with volatile organic compound monitors traveled with the participants. Data for ambient ozone, NO_2, and sulfur dioxide came from a fixed monitoring station in downtown Ottawa.

In the 3 hours after cycling, short-term exposure to traffic-related air pollution was associated with altered autonomic regulation of the heart, specifically parasympathetic modulation. No strong effects on respiratory measures were observed.

The study was strengthened by using personal exposure measures, real-life conditions, and a cross-over design, but it was potentially limited by the lack of data on exposures encountered by participants en route to the study sites, an inability to adjust for respiratory effects on HRV, the small sample size, the short time frame of post-cycling measurements, and the exclusion of additional cardiovascular measures. Additionally, individual exposure data were unavailable for NO_2 and ozone, and associated effects may have been underestimated.

The health benefits of cycling might outweigh the impact of traffic-related air pollution for healthy individuals. However, the effects on cardiac autonomic function demonstrated in this study could potentially be harmful in individuals with underlying cardiovascular issues. Consequently, the authors suggest that bicycle routes and paths be planned so as to avoid exposure to motor vehicle traffic.

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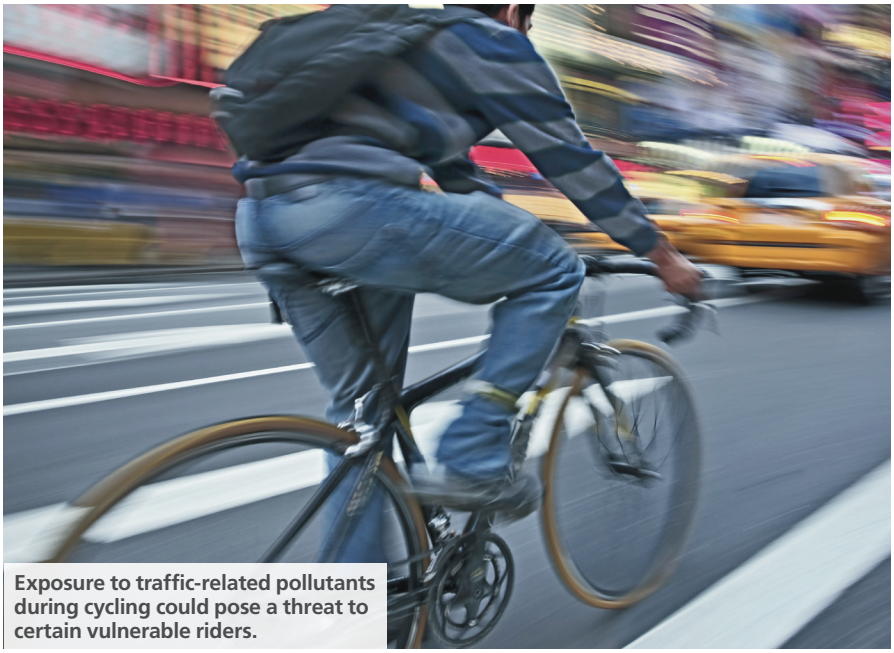

Exposure to traffic-related pollutants during cycling could pose a threat to certain vulnerable riders.

Pregnancy Pause

Extreme Heat Linked to Shortened Gestation

Pregnancy tends to make women more vulnerable to heat stress. Added fat deposits and the attendant decrease in the ratio of body surface area to body mass mean a woman's body is less able to cool off by losing heat to the environment. Heat stress has been linked in earlier studies to induction of uterine contractions, increased secretion of the childbirth-related hormones oxytocin and prostaglandin $F_{2\alpha}$, and increased levels of heat-shock protein 70 (which has been linked to preterm delivery). A new study now suggests maternal exposure to extreme heat may have an immediate effect on pregnancy duration [***EHP* 119(10):1449–1453; Dadvand et al.**].

The Spanish-based research team analyzed birth data for 7,585 women who delivered at the Hospital Clinic of Barcelona between January 2001 and June 2005. They used national data on daily heat and temperature to calculate which days during that period exceeded the 90th (HI_{90}), 95th (HI_{95}), and 99th (HI_{99}) percentiles for heat index for the longer period of 1983–2006.

Pregnancies ranged from 22.2 to 43.5 weeks, with an average of 40 weeks. The results showed that all three HI percentiles were associated with a reduction in pregnancy duration. An HI_{90} episode on the day before delivery (lag 1) was associated with a 1-day reduction in average pregnancy duration, a lag 1 HI_{95} episode was associated with a 2-day reduction, and a lag 1 HI_{99} event was connected to a 5-day reduction. There was little evidence of an association beyond the delivery date and the day before, suggesting that any effect heat stress may have on pregnancy duration is immediate.

When the investigators assessed Europeans versus non-Europeans, they found a relationship between an HI_{99} episode on the day of delivery and an 8-day reduction in average pregnancy duration for European women compared with a 1-day reduction for non-Europeans.

The study was limited by the inability to control for air-conditioner use, study the associations in ethnic groups besides Europeans, or examine how the length of extreme heat episodes affected pregnancy duration. With future climate projections including increases in the frequency and intensity of extreme heat conditions—and given that a reduction of even a week in the length of pregnancy has been linked to adverse health outcomes in newborns—the authors contend that future studies should consider these factors to help inform appropriate public health interventions.

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